

Name(s) of Risk Team Members: P. Cirnigliaro, A. Etkin, R. Karol, E. Lessard, J. Maraviglia, D. Passarello, A. Piper, R. Savage, J. Scott, M. Van Essendelft			Point Value → Parameter ↓	1	2	3	4	5					
Area/Facility Description Title: Collider-Accelerator  Area/Facility # (if applicable): Area-Wide FRA 13			Occupancy or Use	≤once/year	≤once/month	≤once/week	≤once/shift	>once/shift					
Area/Facility Description: PHENIX Area-Wide			Severity	First Aid Only	Medical Treatment	Lost Time	Partial Disability	Death or Permanent Disability					
			Likelihood	Impossible	Unlikely	Possible	Probable	Multiple					
Approved by: <i>E. Lessard</i> Date: 7/15/2004      Rev.#: 1													
Reason for Revision (if applicable):  FRA number added and standard hazard nomenclature added.						Comments:							
				Before Additional Controls					After Additional Controls				
Physical Item or Activity	Hazard(s)	Control(s)	Occupancy A	Severity B	Likelihood C	Risk* AxBxC	Control(s) Added to Reduce Risk		Occupancy A	Severity B	Likelihood C	Risk* AxBxC	% Risk Reduction
Primary Beam	High hazard ionizing radiation	ACS; PASS; postings; crash buttons and chords; C-AD area classification; shielding; dosimeter; training; RSC reviews	1	5	2	10							
General Area Radiation Residual Radiation, External Radiation	Ionizing radiation	Postings, training, shielding, RCD surveys, RCD oversight, RWP, work planning	4	1	2	8							
Hydraulics	Being struck by an object due to a pressure release	Design reviews, ESRC/ASSRC reviews, pressure testing, LOTO, work planning, PPE, training, procedures, posting labeling	3	4	2	24							
Hydraulics	Falls on same level	Design reviews, ESRC/ASSRC reviews, pressure testing, LOTO, work planning, Tier 1 inspections	3	4	3	36							
Hydraulics	Fire	Design reviews, ESRC/ASSRC reviews, proof testing, LOTO, work planning, PPE, training, Fire/Rescue Group response	3	4	2	24							
Electrical Equipment & Power Supplies BNL Class A & B <250 V AC; <1000 V DC	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures	5	4	2	40							
Electrical Equipment & Power Supplies BNL Class C <600 V AC; <6000 V DC	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures; two-person rule for hot work	3	5	2	30							
Electrical Equipment & Power Supplies BNL Class C <600 V AC; <6000 V DC	Arc blast; burn	Procedures, training, PPE	2	5	2	20							

Electrical Disconnects And Switches	Arc blast; burn	Procedures, training, PPE	2	4	3	24					
Electrical Disconnects And Switches	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working hot permits; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures; two-person rule for hot work	2	5	2	20					
Motor Control Centers; Panels And Wall Sockets	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards	4	5	2	40					
Motor Control Centers; Panels And Wall Sockets	Arc blast; burn	PPE; training; procedures	4	4	2	32					
Electrical Powered Hand Tools	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; procedures; training; labeling; work planning; GFCI; grounding standards; double insulation	4	3	3	36					
Extension Chords; Temporary Wiring And Power Strips	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; qualified electricians and technicians; GFCI; grounding standards	4	3	3	36					
Vacuum	Ear damage	Postings; PPE; maintenance; training; work planning; ASSRC reviews; procedures; Tier 1 inspections; Chief ME reviews; vacuum windows covered during handling; use of industry standards; design reviews	3	4	2	24					
Vacuum	Being struck by an object such as flying debris	Postings; PPE; maintenance; training; work planning; ASSRC reviews; procedures; Tier 1 inspections; Chief ME reviews; vacuum windows covered during handling; ; use of industry standards; design reviews	3	4	2	24					
Magnetic Field	Being struck by an object due to adverse mechanical force exerted on ferromagnetic objects and or to electronic/medical implants	Barriers; warning systems; postings; training; ESRC review; work planning; procedures; Tier 1 inspections; magnetic safety reviews; medical exams	1	4	2	8					
Flammable /Explosive Gases	Fire, smoke and heat	Fire detection & suppression systems; procedures; training; equipment protective systems; ASSRC/ESRC reviews; Fire Hazards Analysis; Tier 1 inspections; maintenance; emergency procedures; BNL Fire Rescue; ASE requirements; volume controls; segregation controls; labeling; area posting; gas detection interlock systems	4	4	2	32					
Gasses	Oxygen deficiency	ODH analyses; ODH controls; training; remote/local audible/visible alarms; emergency response; work planning; MSDS; LOTO; postings; flammable gas alarms; cylinder storage controls; cylinder labels; gas volume limits; inspections; cylinder hydrostatic testing	4	5	2	40					

Lighting	Being struck against an object, such as a carpenter walking into a door frame, due to poor visibility	Tier 1 inspections; maintenance; emergency lighting; temporary lighting	3	2	3	18					
Lighting	Falls on same level	Tier 1 inspections; maintenance; emergency lighting; temporary lighting	3	3	3	27					
Lighting	Being struck by an object due to a Material handling mishap	Tier 1 inspections; maintenance; emergency lighting; temporary lighting	2	3	3	18					
Material Handling Equipment	Falls to lower level, such as falling from a ladder or over a railing	Training, work planning, inspections, independent PE inspections and approval of equipment, fall protection training, approved scaffolding and platforms, approved fall protection harnesses, Tier 1 inspections, PPE, PE maintenance	3	4	3	36					
Material Handling Equipment	Becoming caught in or compressed by equipment	Training, work planning, inspections, Tier 1 inspections, PPE	3	4	3	36					
Material Handling	Being struck by an object due to improperly secured material; loss of control	Work planning; equipment specific training; work area barricades and controls; PPE; clamps; straps; vices; fixtures	3	3	3	27					
Chemical Handling	Eye exposure	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	3	4	2	24					
Chemicals	Inhalation exposure	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	3	3	2	18					
Chemicals	Fire; explosions	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	3	2	2	12					
Manual Material Handling	Overexertion – injuries caused by excessive lifting, pushing, pulling, holding, carrying or throwing of an object	Gloves; hardhat; handcarts; dollies; training; safety shoes	4	3	3	36					
Remotely Operated Equipment	Becoming caught in or compressed by equipment	Postings; barriers; guards; maintenance; training; work planning; procedures; Tier 1 inspections; ASSRC reviews	2	4	2	16					
Use Of Hand Tools	Being struck by an object, such as flying chips	PPE; training; maintenance; Tier 1 inspections; UL listed equipment; pre-inspections	4	2	3	24					
Use Of Hand Tools	Being struck against an object, such as sharp surfaces	PPE; training; guarding	4	2	3	24					
Use Of Hand Tools	Becoming caught in or compressed by equipment	Equipment specific training; guarding; PPE; postings	4	2	3	24					
Machining Materials	Becoming caught in or compressed by equipment	Equipment specific training; machine guards; PPE; postings; maintenance; Tier 1 inspections	2	3	3	18					

Machining Materials	Being struck by an object, such as flying chips	Equipment specific training; machine guards; PPE; postings; maintenance; Tier 1 inspections	2	3	3	18						
Machining Materials	Non-rad airborne particulates	PPE; ventilation; maintenance; work planning	2	1	2	4						
Walking – Working Surfaces	Falls on same level	PPE; Tier 1; work planning; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; lessons learned	5	4	3	60	A safety checklist: Walking and Working Surfaces was distributed to staff. C-A O.P.M. 2.28.d was updated to indicate that work performed with risk factors of slipping and falling shall be classified at a minimum as a moderate hazard job and will require additional review and an Enhance Work Permit.	5	4	2	40	33%
Work At Heights	Falls to lower level, such as falling from a ladder or over a railing	Postings; barriers; fall protection; maintenance; training; work planning; procedures; Tier 1 inspections; PPE; approved scaffolding and platforms; approved ladders; anti-slip surfaces	4	5	3	60	An ad hoc committee has been appointed to address the issue of fall protection during shield block work. The principal difficulties concern the infeasibility of conventional fall protection methods in certain situations and the possibility of creating a greater hazard when using certain fall protection methods.					
Working Environment	Poor air quality; mold	HVAC; facility maintenance; Tier 1 inspections	5	2	2	20						
Water	Being struck by an object due to a pressure release	Postings; maintenance; PPE; training; work planning; ASSRC review; procedures; Tier 1 inspections; PLC monitoring and interlocks	4	1	3	12						
Water	Contact with temperature – extremes that result in such injuries as heat exhaustion, frost bite or burns	Postings; maintenance; PPE; training; work planning; ASSRC review; procedures; Tier 1 inspections	4	1	2	8						
Tours	Internal or external radiation	Postings; trained escorts; RCD concurrence to enter radiation areas; RWP; work planning; training waiver; red TLD; BNL minors policy	3	1	2	6						
Transformer And Switch Yards	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; installations comply with applicable codes; procedures; training; LOTO; qualified electricians; postings; locked areas; work planning; grounding standards; emergency procedures; grounding before work start	2	5	2	20						
Transformer And Switch Yards	Arc blast	PPE; procedures; training; qualified electricians	2	4	2	16						
Standby Generators	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards; emergency procedures	2	5	2	20						
Standby Generators	Noise	Hearing protection	2	4	2	16						
Radioactive Sources	Internal or external radiation	Training; BNL and C-AD source custodians; source inventory; shielding; locked boxes; leak checks; posting; dosimetry; Chipmunk calibration procedures; locked cage for Chipmunk source	2	1	2	4						
Pressurized Systems	Being struck by an object due to a pressure release	Postings; PPE; maintenance; training; work planning; ESRC reviews; procedures; interlock systems; certification/testing of pressure related equipment; Tier 1 inspections; LOTO; C-AD Chief ME reviews; codes and standards usage	2	2	2	8						

Noise	Hearing loss	Training; hearing protection; noise surveys; procedures; postings; medicals; engineered noise reduction; work planning; locked areas with limited access to authorized personnel only	2	4	2	16					
Egress	Impaired egress	Tier 1; work planning; skill of craft; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; internal processes; lessons learned; life safety codes; emergency preparedness	5	3	3	45					
Cryogenic	Being struck by an object due to a pressure release	Postings; maintenance; training; work planning; LOTO; Cryogenic Safety Committee /ASSRC reviews; procedures; PPE; interlock systems; Tier one inspection; pressure testing	4	2	2	16					
Cryogenic	Contact with temperature – extremes that result in such injuries as frost bite or burns	Postings; maintenance; training; work planning; LOTO; Cryogenic Safety Committee /ASSRC reviews; procedures; PPE; interlock systems; Tier 1 inspection	4	3	2	24					
Confined Spaces	Becoming caught in or compressed by equipment	Barriers; postings; training; Confined Spaces Permits; work planning; procedures; Tier 1 inspections	2	2	3	12					
Computer And Office Machine Usage	Repetitive motion	BNL SHSD ergonomic reviews; training; use of ergonomically designed equipment	5	3	3	45					
Batteries/UPS	Molten spray	PPE; procedures; training	4	2	2	16					
Limited Access Areas	Impaired egress	Tier 1; work planning; skill of craft; training; barriers;	3	3	1	9					
Lasers	Eye damage	Barriers; interlock systems; postings; training; LSO review; work planning; PPE; procedures; Tier 1 inspections; warning systems	2	4	3	24					
Confined Spaces	Oxygen deficiency	Training; atmospheric testing before entry and periodically; entry procedures; Permits; work planning; LOTO; respirators; forced ventilation; personnel rescue equipment; emergency planning	1	5	2	10					
Confined Spaces - Metal	Increased chance of shock due of proximity to conducting surfaces	All equipment is listed or reviewed by CEE; work planning; grounding standards; GFCI	1	3	2	6					
Further Description of Controls Added to Reduce Risk:											
*Risk:	0 to 20	21 to 40	41-60				61 to 80			81 or greater	
	Negligible	Acceptable	Moderate				Substantial			Intolerable	